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PATENT COOPERATION TREATY

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From the
INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

PCT

To:

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ALLEMAGNE

NOTIFICATION OF TRANSMITTAL OF
THE INTERNATIONAL PRELIMINARY
EXAMINATION REPORT

(PCT Rule 71.1)

Date of mailing *(day/month/year)*	18.10.2004

Applicant's or agent's file reference	
93 203 a/sk	**IMPORTANT NOTIFICATION**

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/EP 02/06508	13.06.2002	13.06.2002

Applicant
DOCOMO COMMUNICATIONS LABORATORIES EUROPE GMBH

1. The applicant is hereby notified that this International Preliminary Examining Authority transmits herewith the international preliminary examination report and its annexes, if any, established on the international application.

2. A copy of the report and its annexes, if any, is being transmitted to the International Bureau for communication to all the elected Offices.

3. Where required by any of the elected Offices, the International Bureau will prepare an English translation of the report (but not of any annexes) and will transmit such translation to those Offices.

4. **REMINDER**

    The applicant must enter the national phase before each elected Office by performing certain acts (filing translations and paying national fees) within 30 months from the priority date (or later in some Offices) (Article 39(1)) (see also the reminder sent by the International Bureau with Form PCT/IB/301).

    Where a translation of the international application must be furnished to an elected Office, that translation must contain a translation of any annexes to the international preliminary examination report. It is the applicant's responsibility to prepare and furnish such translation directly to each elected Office concerned.

    For further details on the applicable time limits and requirements of the elected Offices, see Volume II of the PCT Applicant's Guide.

    The applicant's attention is drawn to Article 33(5), which provides that the criteria of novelty, inventive step and industrial applicability described in Article 33(2) to (4) merely serve the purposes of international preliminary examination and that "any Contracting State may apply additional or different criteria for the purposes of deciding whether, in that State, the claimed inventions is patentable or not" (see also Article 27(5)). Such additional criteria may relate, for example, to exemptions from patentability, requirements for enabling disclosure, clarity and support for the claims.

Name and mailing address of the International preliminary examining authority:	Authorized Officer
European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Benigar, M Tel. +49 89 2399-2996

Form PCT/IPEA/416 (January 2004)

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT
(PCT Article 36 and Rule 70)

Applicant's or agent's file reference 93 203 a/sk	**FOR FURTHER ACTION**	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)

International application No. PCT/EP 02/06508	International filing date *(day/month/year)* 13.06.2002	Priority date *(day/month/year)* 13.06.2002

International Patent Classification (IPC) or both national classification and IPC
H04Q7/38

Applicant
DOCOMO COMMUNICATIONS LABORATORIES EUROPE GMBH

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1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 6 sheets, including this cover sheet.

   ☒ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

   These annexes consist of a total of 10 sheets.

3. This report contains indications relating to the following items:

   I   ☒   Basis of the opinion

   II   ☐   Priority

   III   ☐   Non-establishment of opinion with regard to novelty, inventive step and industrial applicability

   IV   ☐   Lack of unity of invention

   V   ☒   Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

   VI   ☐   Certain documents cited

   VII   ☐   Certain defects in the international application

   VIII   ☐   Certain observations on the international application

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Date of submission of the demand 07.01.2004	Date of completion of this report 18.10.2004

Name and mailing address of the international preliminary examining authority: European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized Officer Mele, M Telephone No. +49 89 2399-7994

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/EP 02/06508

I. Basis of the report

1. With regard to the **elements** of the international application *(Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17))*:

Description, Pages

1-40	as originally filed
3a	received on 26.05.2004 with letter of 26.05.2004

Claims, Numbers

1-44	received on 26.05.2004 with letter of 26.05.2004

Drawings, Sheets

1/15-15/15	as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

   These elements were available or furnished to this Authority in the following language: , which is:

   ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).

   ☐ the language of publication of the international application (under Rule 48.3(b)).

   ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

   ☐ contained in the international application in written form.

   ☐ filed together with the international application in computer readable form.

   ☐ furnished subsequently to this Authority in written form.

   ☐ furnished subsequently to this Authority in computer readable form.

   ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

   ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

   ☐ the description,   pages:

   ☒ the claims,   Nos.:   45-48

   ☐ the drawings,   sheets:

5. ☐   This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)).

(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	1-44
	No:	Claims	
Inventive step (IS)	Yes:	Claims	1-44
	No:	Claims	
Industrial applicability (IA)	Yes:	Claims	1-44
	No:	Claims	

2. Citations and explanations

   see separate sheet

Re Item I
Basis of the opinion

1.   The Applicant has provided with the letter of 26.05.2004 amended **Claims 1 to 44** and **description page 3a (Article 19(1) PCT)**. These amendments comply to **Articles 19(2) and 34(2)(b) PCT.**

2.   Reference is made to the following documents:

D1: √WO 01/ 58182 A2
D2:√ EP 0 802 694 A2
D3:√ WO 00/ 67514 A1
D4:√ US 2001/ 005 683 A

Re Item V
Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

3.   The present application meets the requirements of **Articles 33(2) and 33(3) PCT,** because the subject-matter of **Claim 1** is novel and involves an inventive step for the following reasons.

Document **D1** (see in particular page 2, lines 19-24, page 4, lines 1-3, page 18, lines 18 to page 19, line 1; lines 4-7; lines 14-23; page 21, lines 9-18; page 22, lines 14-21), which is considered to represent the most relevant state of the art, discloses, according to features of **Claim 1** (applying the terminology of present **Claim 1** and the references to **D1**), a method of assisting (page 2, lines 19-24) at least one handover for a mobile device in a mobile communication environment with a plurality of access points (page 4, lines 1-3), comprising the steps of:

-   proactively determining handover decision criteria (the network provide informations for future hand-off based on historical data: page 18, line 18 - page 19, line 1; lines 4-7) in relation to the at least one handover and according to an operational context (speed, direction of the mobile terminal: page 21, lines 9-12; historical data about the paths travelled by the mobile station: page 19, lines 14-23; or quality metrics: page 22, lines 14-21) into a subsystem of the mobile communication environment (the mobile station receives handoff instructions from the network in advance: page 21, lines 14-18) executing the handover;

- · determining at least one new access point (a second base station: page 19, lines 18-24) for the mobile device using the handover decision criteria (page 19, lines 18-24).

The subject-matter of **Claim 1** differs from the disclosure of **D1** in the steps of:

- determining an operational context as a profile of applications being executed in the mobile device before or at the time of pro-active deployment of the handover decision mechanism;

- proactively deploying a handover decision mechanism in relation to the at least one handover and according to an operational context.

The objective technical problem solved by these feature would be considered by the skilled person as to determine the handoff conditions in relation to an operational context on the base of an application profile for a mobile station.

Document **D1** discloses to proactively determine the handover decision criteria, but it is silent about determining the operational context in relation of the profile of an application running on the mobile terminal and determining the handoff mechanism based on this application profile.

On the other hand, document **D3** (see in particular page 8, lines 9-18; page 9, lines 21-34) discloses a communication network predicting when a handoff for a mobile station is likely to occur, based on a set of predetermined parameter associated with the mobile station. However, **D3** is silent about determining an operational context determined from the profile of the application being executed in the mobile device.

Moreover, **D2** and **D4** generically concern aspects of the handoff procedure and therefore, even if taken alone or in combination with **D1**, the previous prior art documents do not allow a skilled person to come in an obvious way to determine an handoff mechanism from the operational context determined from the profile of an application being executed in the mobile device and to deploy this handoff mechanism in the mobile device proactively.

This feature combination is therefore neither know from **D1** nor rendered obvious by the other available prior art

The subject-matter of **Claim 1** therefore involves an inventive step **(Article 33(3) PCT).**

4.   The same considerations as made in respect of independent **Claim 1** are also valid for independent **Claims 22** and **44**, which contain a corresponding feature combination as **Claim 1** in terms of claims relating to an apparatus and to a computer program for performing the method of **Claim 1**.

Therefore the subject-matter of **Claims 22** and **44** involves an inventive step and satisfies the criterion set forth in **Article 33(3) PCT.**

5.   **Claims2** to **21** **and 23** to **43** are dependent on **Claims 1 and 22** respectively, and as such also meet the requirements of the PCT with respect to novelty and inventive step **(Articles 33(2) and 33(2) PCT).**

6.   The attention of the Applicant is drawn to the further deficiencies:

6.1 Independent **Claims 1, 22 and 44** have not been correctly drafted in the two-part form, with all the features known in combination from **D1** placed in their preamble as recommended by **Rule 6.3(b) PCT.**

6.2 The features of the preambles of the claims are not provided with reference signs placed in parentheses **(Rule 6.2(b) PCT).**

6.3 The vague and imprecise statement in the description at page 40, from line 24 ("it should...") to line 28 (word "therefore") implies that the subject-matter for which protection is sought may be different to that defined by the claims, thereby resulting in lack of clarity of the claims when used to interpret them **(Article 6 PCT).** Therefore, this passage should have been deleted to remove this inconsistency.

New Claims

(Auxiliary Request)

1. Method of assisting at least one handover for a mobile device in a mobile communication environment with a plurality of access points, **characterized by** the steps:

    -   determining an operational context as a profile of applications being executed in the mobile device before or at the time of pro-active deployment of the handover decision mechanism.

    -   proactively deploying a handover decision mechanism in relation to the at least one handover and according to the operational context into a subsystem of the mobile communication environment executing the handover;

    -   determining at least one new access point for the mobile device using the deployed handover decision mechanism.

2. Method according to claim 1, **characterized in that** it further comprises the step to determine a current position of the mobile device as operational context.

3. Method according to claim 2, **characterized in that** it further comprises the step of predicting a movement of the mobile device as operational context.

4. Method according to claim 3, **characterized in that** the step of predicting a movement of the mobile device is related to a movement path of the mobile device.

5. Method according to claim 4, **characterized in that** the step of predicting a movement of the mobile device is further related to a movement speed of the mobile device.

6. Method according to claim 1, **characterized in that** the profile of applications is related to a group comprising video, still image, audio, text, and speech applications.

7. Method according to claim 1, **characterized in that** the profile of applications is related to a group comprising interactive, point-to-point, one-way and/or multipoint applications.

8. Method according to one of the claims 1 to 7, **characterized in that** it further comprises the step of determining the operational context of the mobile device as a profile of at least one mobile device user.

9. Method according to one of the claims 1 to 8, **characterized in that** it further comprises the step of identifying at least one candidate access point as input to the handover decision mechanism.

10. Method according to claim 9, *characterized in that* the at least one candidate access point is identified using existing handover mechanisms.

11. Method according to one of the claims 9 or 10, *characterized in that* candidate access points are ranked according to dynamic criteria.

12. Method according to claim 11, *characterized in that* criteria are selected from a group comprising signal strength, bandwidth, supported applications, quality of service, network usage, power consumption.

13. Method according to claim 1, *characterized in that* the handover decision mechanism is deployed into the access point of the mobile communication network.

14. Method according to claim 1, *characterized in that* the handover decision mechanism is deployed in the mobile device.

15. Method according to claim 1, *characterized in that* the handover decision mechanism is deployed in access point of the mobile communication environment and in the mobile device.

16. Method according to one of the claims 1 to 15, *characterized in that* it further comprises the step of deploying the handover decision mechanism through transfer of code data achieving the determination of the at least one new access point for the mobile device.

17. Method according to one of the claims 1 to 16, *characterized in that* it further comprises the step of deploying the handover decision mechanism through transfer of criteria for the at least one new access point.

18. Method according to claim 17, *characterized in that* criteria are described as data structure.

19. Method according to one of the claims 1 to 18, *characterized in that* it further comprises the step of un-deploying the handover decision mechanism when it is no more relevant.

20. Method according to one of the claims 1 to 19, *characterized in that* the mobile device is a mobile telephone, a personal digital agent, a portable computer or a hybrid.

21. Method according to one of the claims 1 to 20, *characterized in that* handover is achieved according to a standard selected from a group comprising GSM, PDC, GPRS, PPP, HSCSD, WLAN, HiperLAN, IrDa, Bluetooth, IS 45, IS 95, IMT 2000.

22. Handover assisting apparatus for a mobile device in a mobile communication environment with a plurality of access points, *characterized by*:

- an application profile unit adapted to determine an operational context as a profile of applications being executed in the mobile device before or at the time of pro-active deployment of the handover decision mechanism, and

- a pro-active deployment unit adapted to pro-actively deploying a handover decision mechanism in relation to the at least one handover and according to an operational context into a subsystem of the mobile communication environment executing the handover.

23. Hand over assisting apparatus according to claim 22, **characterized in that** it further comprises an access point determination unit adapted to determine at least one new access point for the mobile device using the deployed handover decision mechanism.

24. Handover assisting apparatus according to claim 22 or 23, **characterized in that** a context determination unit comprises a position unit adapted to determine a current position of the mobile device as operational context.

25. Handover assisting unit according to one of the claims 22 to 24, **characterized in that** a context determination unit further comprises a movement prediction unit adapted to predict a movement of the mobile device as operational context.

26. Handover assisting unit according to claim 25, *characterized in that* the movement prediction unit is adapted to predict a movement of the mobile device according to a movement path.

27. Handover assisting unit according to claim 25 or 26, *characterized in that* the movement prediction unit is adapted to predict a movement of the mobile device according to a movement speed.

28. Handover assisting unit according to claim 22, *characterized in that* the application profile unit is adapted to determine the profile of applications in relation to a group comprising video, still image, audio, text, and speech applications.

29. Handover assisting unit according to claim 22, *characterized in that* the application profile unit is adapted to determine the profile of applications in relation to a group comprising a group comprising interactive, point-to-point, one-way and/or multipoint applications.

30. Handover assisting unit according to one of the claims 22 to 29, *characterized in that* the context determination unit further comprises an user profile unit adapted to determine the operational context of the mobile device as a profile of at least one mobile device user.

31. Handover assisting apparatus according to one of the claims 27 to 30, *characterized in that* the access point determination unit comprises a candidate access point

determination·unit adapted to identify at least one candidate access point as input to the handover decision mechanism.

32. Handover assisting apparatus according to claim 31, *characterized in that* the candidate access point determination unit is adapted to identify the at least one candidate access point using existing handover mechanisms.

33. Handover assisting apparatus according to claim 31 or 32, *characterized in that* the candidate access point determination unit is adapted to rank candidate access points according to dynamic criteria.

34. Handover assisting apparatus according to claim 33, *characterized in that* the candidate access point determination unit is adapted to rank candidate access points according to dynamic criteria selected from a group comprising signal strength, bandwidth, supported applications, quality of service, network usage, power consumption.

35. Handover assisting apparatus according to one of the claims 22 to 32, *characterized in that* the context determination unit further comprises a handover type determination unit adapted to select a handover type.

36. Handover assisting apparatus according to claim 35, *characterized in that* the handover type determination unit is adapted to select a network assisted hand over.
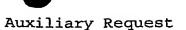
37. Handover assisting apparatus according to claim 35, *characterized in that* the handover type determination unit is adapted to select a mobile device assisted hand over.

38. Handover assisting apparatus according to claim 35, *characterized in that* the handover type determination unit is adapted to select a combined network assisted and mobile device assisted hand over.

39. Handover assisting apparatus according to one of the claims 22 to 38, *characterized in that* the proactive deployment unit is adapted to deploy the handover decision mechanism through transfer of code data achieving the determination of the at least one new access point for the mobile device.

40. Handover assisting apparatus according to one of the claims 22 to 39, *characterized in that* the proactive deployment unit is adapted to deploy the handover decision mechanism through transfer of criteria for the at least one new access point.

41. Handover assisting apparatus according to claim 40, *characterized in that* the proactive deployment unit is adapted to transfer criteria according to a data structure.

42. Handover assisting apparatus according to one of the claims 22 to 41, *characterized in that* the proactive deployment unit is adapted to un-deploy the handover decision mechanism when it is no more relevant.

43. Handover assisting apparatus according to one of the claims 22 to 40, **characterized in that** handover is assited according to a standard selected from a group comprising GSM, PDC, GPRS, PPP, HSCSD, WLAN, HiperLAN, IrDa, Bluetooth, IS 45, IS 95, IMT 2000.

44. Computer program product directly loadable into the internal memory of a mobile communication unit, comprising software code portions for performing the steps of one of the claims 1 to 21, when the product is run on a processor of the mobile communication unit.

SUMMARY OF INVENTION

In view of the above, the object of the present invention is to provide for mechanisms to achieve optimal selection of new access points for mobile devices located/roaming in a mobile communication environment.

According to the present invention, this object is achieved through a method of assisting at least one handover for a mobile device in a mobile communication environment which has a plurality of access points having the features of claim 1.

According to the present invention operational context may be understood as operational context being available at the